

Peripheral self-expandable stent catheter fracture: Retrieval of two different components with two different modalities

Periferik kendiliğinden genişleyebilen stent kateterinin kırılması: İki farklı parçanın iki farklı yöntem ile çıkarılması

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Summary—A 58-year-old man whose right superficial femoral artery had been stented 2 weeks previously presented at the emergency service complaining of right leg pain of 2 days' duration. Angiography revealed a radiopaque foreign body distal to the stent. It was removed with a snare. Due to sudden disappearance of the popliteal artery pulse seventy-two hours after the procedure, an urgent control angiogram was performed, which showed a large thrombus occluding the superficial femoral artery. Surgery revealed a second larger radiolucent foreign body causing the thrombus. This was recognized as the distal tip and shaft of the peripheral self-expandable stent catheter used in the initial procedure. This report discusses preventive measures to be taken against this complication.

Diverse complications may arise with extensive use of percutaneous techniques. One such complication is catheter fracture, in which unnoticed catheter fragments may cause foreign object complications. Removal of intravascular foreign bodies using percutaneous techniques reduces the need for surgery,^[1] but their use requires the presence of radioopacity.

We report a case in which two foreign bodies, one radiopaque and one radiolucent, were removed by snare and surgery respectively.

CASE REPORT

A 58-year-old man presented at the emergency service complaining of right leg pain of 2 days duration.

Özet— İki hafta önce sağ yüzeysel femoral arterine stent takılmış 58 yaşında erkek hasta, acil servise iki gündür olan sağ bacak ağrısı ile başvurdu. Anjiyografide stent distalinde radyopak yabancı cisim görüldü ve “snare” yardımıyla çıkarıldı. İşlemden 72 saat sonra popliteal arter nabzının aniden kaybolması nedeniyle acil periferik anjiyografi yapıldı ve yüzeysel femoral arterin yoğun trombus ile tıkalı olduğu görüldü. Cerrahi girişim sonrasında trombusun nedeninin daha büyük ışın geçiren bir yabancı cisim olduğu anlaşıldı. Yabancı cisimlerin ilk işlemde kullanılan kendiliğinden genişleyebilen stent kateterinin şaftı ve distal ucu olduğu anlaşıldı. Bu olgu sunumunda, bu komplikasyondan korunmanın yolları tartışıldı.

He had a history of right superficial femoral artery (SFA) angioplasty with 6x40 mm self-expandable nitinol stent (S.M.A.R.T CONTROL, Cordis Corporation, USA) deployment two weeks previously (Figure 1a, b). He had been discharged uneventfully two days after this procedure and had been on proper antiaggregant treatment in the intervening time. On physical examination, his right popliteal and dorsalis pedis artery pulses were weak. Color Doppler ultrasonography (USG) raised suspicion of a tubular foreign body distal to the stent.

The patient was taken to the catheterization laboratory to have the object removed percutaneously. The

Abbreviations:

CFA	Common femoral artery
SFA	Superficial femoral artery
USG	Ultrasonography

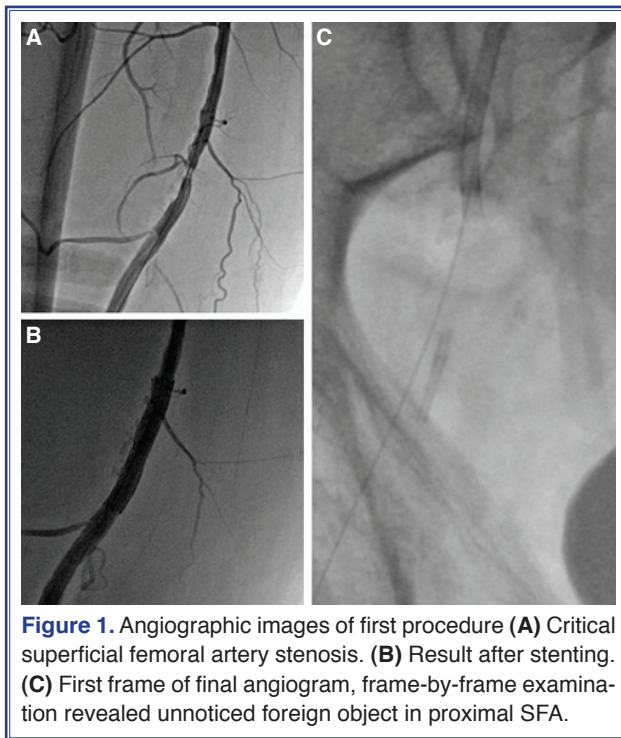
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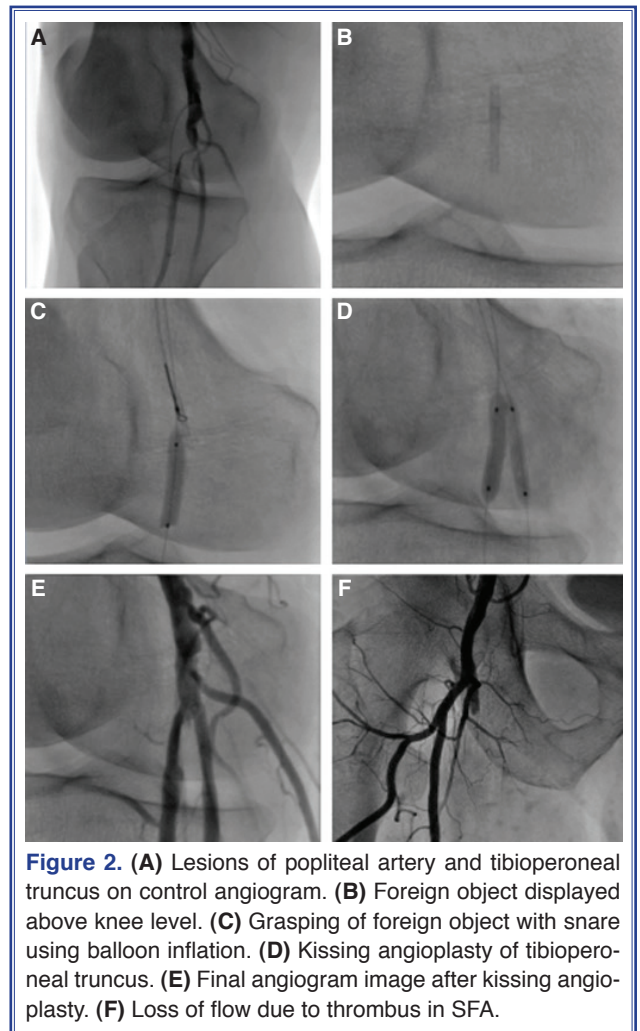
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right common femoral artery (CFA) was retrogradely cannulated with a 7F sheath. The control peripheral angiogram revealed thrombosis in the popliteal artery and critical stenosis in the tibioperoneal truncus and anterior tibial artery without stent thrombosis or dissection of the SFA (Figure 2a). Cineangiography revealed a radiopaque object clearly evident above knee level (Figure 2b). A 6F Judkins right guiding catheter was advanced, but several attempts to grasp the object using a loop snare (SeSure, Lifetech Scientific, China) failed. A 0.014 cm floppy guidewire was passed beyond the object and a 4.0x15 mm compliant balloon was advanced to the distal level of the object. The balloon was inflated in order to detach the proximal tip of the object, which was stuck fast to the vessel wall. Meanwhile, the mobilized proximal tip was grasped with the snare and pulled back (Figure 2c), and the distal popliteal artery treated with kissing balloon angioplasty (3.0x20 mm, 4.0x20 mm compliant balloon) (Figure 2d, e). The retrieved object was seen to be the distal part of a catheter shaft that carries the stent (Figure 3a). Due to high thrombus burden, 15 mg of tissue plasminogen activator (tPA) was infused through the guiding catheter at the end of the procedure, and tirofiban infused for 24 hours post-procedure.

After an uneventful 72-hour follow-up, the patient's



right lower extremity pulses abruptly disappeared. Urgent angiography revealed loss of flow due to thrombus in the SFA (Figure 2f), and the patient underwent immediate surgery. During surgical embolectomy, another foreign object was retrieved. The operation was completed with femoral popliteal bypass grafting due to failure to provide adequate distal flow. Post-operative distal pulses were satisfactory. The object retrieved by surgery was the fractured inner shaft of a catheter that carries a self-expandable stent (Figure 3a). After observing both objects under fluoroscopy, it was realized that the latter object was radiolucent (Figure 3c). In a careful review of the initial procedure's final angiogram, the second foreign body was barely perceptible in the CFA for a short period of time in the initial frames (Figure 1c). The object revealed in the CFA had been retrieved from the popliteal artery in the salvage procedure. Although the radiopaque object

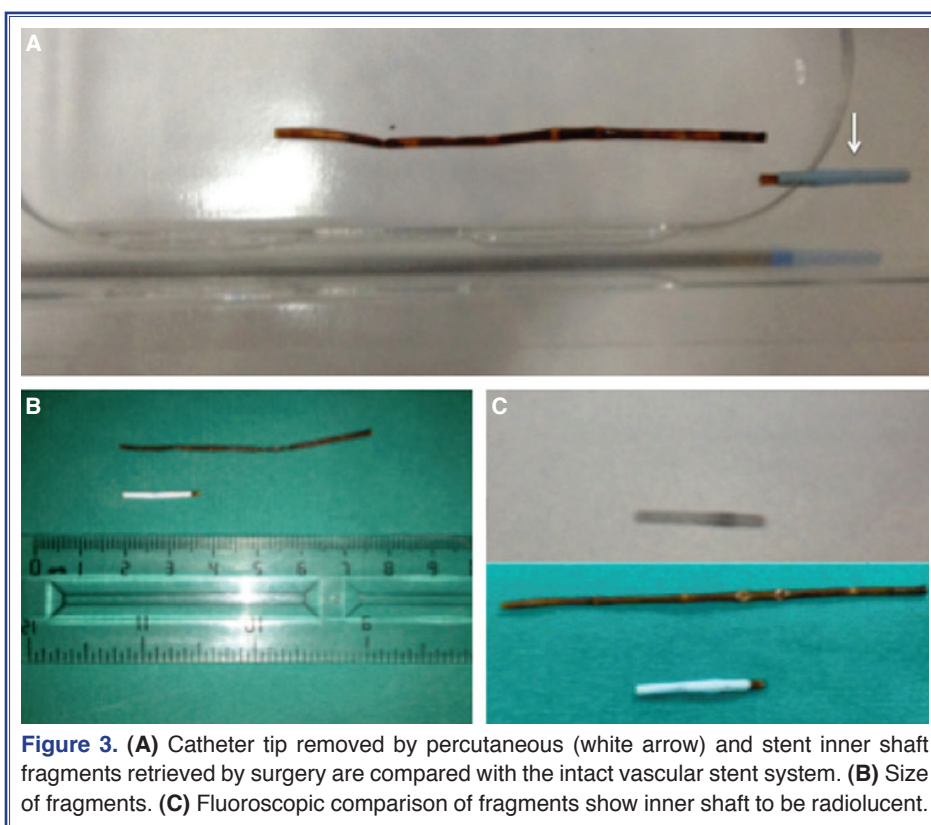


Figure 3. (A) Catheter tip removed by percutaneous (white arrow) and stent inner shaft fragments retrieved by surgery are compared with the intact vascular stent system. (B) Size of fragments. (C) Fluoroscopic comparison of fragments show inner shaft to be radiolucent.

had obviously migrated, the exact location of the radiolucent object could not have been predicted in either the first or second percutaneous procedure. Detailed examination of the initial procedure's final angiogram concluded that the guidewire was not passing through the object lumen (Figure 1c). On further investigation, it was revealed that at the initial procedure, the inner shaft of the stent had had to be pulled back forcefully following stent expansion, and the catheter had been taken back unintentionally with the guidewire. The stent had been rewired for post-dilation.

DISCUSSION

Angioplasty catheter fractures are relatively rare complications, but fatal when undetected. They are mainly recognized at the time of, or after, procedure due to flow loss. Some studies show catheter fragments as the most frequently retrieved foreign bodies,^[2] and while percutaneous techniques are usually successful in retrieval, surgery is sometimes required.^[3] Mainar et al. presented 38 cases of intravascular foreign body, in which only 2 of 17 catheter components retrieved were radiolucent.^[4] Radiopaque foreign bodies can be removed under fluoroscopy using various snaring

devices. With fluoroscopy, radiolucent foreign bodies are scarcely recognizable, whereas digital subtraction angiography (DSA) allows for detection by revealing a 'filling defect'. However, USG clearly shows the location and size of any radiolucent foreign body, and percutaneous retrieval of non-opaque foreign bodies may be carried out with USG guidance.^[5] In addition, foreign bodies may be composed of radiopaque and radiolucent elements, and as a result, multimodality imaging should be used to evaluate foreign bodies regardless of opacity.

All catheter fractures appearing in the literature involved coronary balloon angioplasty catheters.^[6] Even though peripheral catheters are larger and stronger compared to coronary catheters, this case reported a fracture of a peripheral stent catheter. An unprepared and severely calcified lesion was the reason for catheter fracture in this case. After stent deployment, the catheter remained stuck and was pulled back forcefully. Instead of this, it would be better to rewire the stent and expand it with balloon angioplasty to liberate the catheter. This case emphasizes the importance of lesion preparation in severely calcified and tight lesions when using self-expandable stents.

The operator should keep in mind that the foreign body may have both radiopaque and radiolucent components. In order to ensure that fracture of a balloon catheter does not go unnoticed, the operator should examine the catheter thoroughly after the procedure. Moreover, the final angiogram should be checked with great care, whatever the result. Even after successful retrieval of a foreign body, USG or computed tomography angiography should be performed.

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Key words: Angioplasty, ballon; foreign body; peripheral intervention; stents; ultrasonography.

Anahtar sözcükler: Anjiyoplasti, balon; yabancı cisim; periferik girişim; stent; ultrasonografi.